COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
FINAL
PRELIMINARY ASSESSMENT

FARMERS DITCH PCE (CON000801992)
NORTHGLENN, ADAMS COUNTY, COLORADO

Colorado Department of Public Health and Environment

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1.0 INTRODUCTION

The Preliminary Assessment/Site Inspection Program (PA/SI) of the Hazardous Materials and Waste Management Division (HMWMD) of the Colorado Department of Public Health and Environment (CDPHE), under a cooperative agreement with the United States Environmental Protection Agency (EPA), has conducted a Preliminary Assessment (PA) of the Farmers Ditch PCE Site located along Farmers Creek in an open space area, behind 10380 Melody Drive in Northglenn, Colorado 80234 (Figure 1). This PA was performed under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

This PA was prompted by a referral from CDPHE's HMWMD Voluntary Cleanup (VCP) and Redevelopment Program that identified a plume present southwest of the O'Meara Ford automobile dealership (O'Meara Ford) at 400 West 104th Street. The groundwater contains tetrachloroethylene (PCE) contamination in several on-site groundwater monitoring wells at concentrations up to 200 micrograms per liter (µg/l) or parts per billion (ppb). The source of the PCE plume is not known and there is no data on the nature and extent of the plume in the area to the southwest of O'Meara Ford where the plume may originate. It is possible that some illegal dumping of PCE may have occurred along Farmers Creek, in an open space area behind several residences and O'Meara Ford.

2.0 OBJECTIVES

The purpose of this PA is to collect information concerning conditions at the Farmers Ditch PCE Site (Site) and surrounding area, with regard to EPAs Hazard Ranking System (HRS) criteria, sufficient to assess the threat posed to human health and the environment, and to determine the need for additional CERCLA/SARA work or other appropriate action. Specific objectives include:

- Evaluating and summarizing existing Site information and data;

- Identifying source areas and source types;
- Describing the pathways potentially impacted by the Site;
- Identifying and describing targets within each pathway; and
- Determining whether additional assessment is warranted.

3.0 BACKGROUND INFORMATION

3.1 LOCATION AND SITE DESCRIPTION

The Farmers Ditch PCE Site is located adjacent to Farmers Ditch in an open area east of 10380 Melody Dr. and southwest of O'Meara Ford, Northglenn, Colorado (Figure 1). There are several single family residences along Melody Drive southwest of O'Meara Ford. PCE contaminated groundwater was detected in this area during a sampling event for the O'Meara Ford VCP site in January of 2014 (Figure 2). The coordinates of the Site are 104.992995°W longitude and 39.882981°N latitude. These coordinates are for a location east of 10380 Melody Dr. The 3.52 acre open space area is located in Northglenn, Colorado, approximately nine miles north of downtown Denver. According to Adams County records, the property is owned by Northglenn Greens Holdings LLC and noted as parcel #0171915201029. The Farmers Ditch PCE Site consists of an open space area that contains an underground culvert across the Site. The Site is bounded to the north, south and west by residences and to the east and northeast by O'Meara Ford.

It should be noted that by the VCP applicant's interpretation is that there are two plumes that have been identified on the O'Meara Ford site and that the plume on the southwest portion of the site is coming from an offsite source. This PA is intended to investigate the possible offsite source.

There are approximately 814 residents within ¼ mile of the Site. Population within a one mile radius of the Site is approximately 16,400. Within a 4 mile radius, the population is approximately 181,222. Figures 3 and 4 show the 4 mile radius groundwater targets and the 15 mile downstream target distance maps for the Site.

It is possible the plume originates in the open space along the Farmers Ditch area, down-gradient of the O'Meara Ford. The O'Meara Ford Center car dealership is adjacent to the north and

northwest of the Site, which has groundwater wells showing low level PCE contamination. (Figure 2)

The O'Meara Ford has entered CDPHE's Voluntary Cleanup Program (RV111208-1) where PCE has been detected since 2011.

3.2 SITE HISTORY AND PREVIOUS WORK

The Site was referred to the PA/SI Program from CDPHE's VCP staff. . In 2013, at the request of CDPHE's VCP staff, Wassenaar installed several wells southwest of O'Meara Ford to determine the extent of PCE contamination of the groundwater. Contaminated groundwater was detected southwest of O'Meara Ford indicating there is the potential for an additional source which is the subject of this PA. A 2014 groundwater monitoring report (A.G. Wassenaar, 2014) was used as reference for the information provided in this report.

Table 1 is a summary of PCE detections in O'Meara Ford monitoring wells in the southwestern portion of the Site. The earliest detections at the Farmers Ditch Site were observed in January of 2013, although this corresponds to the date the earliest wells were installed and it is likely the plume existed prior to 2013. The location of these wells and sampling results are shown on Figure 2.

The Farmers Ditch PCE Site is characterized by PCE concentrations in the groundwater up to 200 µg/L as shown on Figure 2. Monitoring wells on the southwest boundary of the O'Meara Ford Site indicate PCE concentrations below 100 µg/L since 2011. PCE has also been detected on the northeast section of O'Meara Ford, however, at relatively low concentrations of less than 7.0 µg/L.

No other commercial businesses are located adjacent to the Farmers Ditch PCE Site open space area and private single family residences surround the open space area.

3.3 SITE CHARACTERISTICS

3.3.1 Geology and Hydrogeology

The Site is located in the western portion of the Denver Basin. A topographical map of the East Lake Quadrangle is shown on Figure 5. The Denver Basin includes a series of sedimentary bedrock formations generally consisting of shale, claystone, siltstones, sandstones, and conglomerates. The specific formation underlying the Site is the Denver/Arapahoe formation,

which consists of sandstone mudstone, and conglomerates. The top of the bedrock is generally covered by fine grained clay sized soils which contain the shallow unconfined groundwater.

The site specific shallow geology was determined by examination of soil samples taken during soil borings to 25 feet bgs in 2013-2014 (Wassenger, 2011). The lithology across the Site consists of brown silty and/or sandy clays interspersed and underlain with silty sands. The top of the bedrock was encountered between 5.5 feet and 10.5 feet bgs.

The depth to groundwater on the Site ranges from approximately 7 to 14 feet bgs. Based on groundwater measurements taken in July 2013 and January 2014, groundwater flows south across the Site (Figure 6). Surface water flows through an underground culvert across the Site and reemerges at Farmers Ditch south of the Site. Farmers Ditch is fed from Croke Reservoir, 1000 feet northwest of the Site. The Farmers Creek south of the Site drains in a collection pond approximately 950 feet downstream.

3.3.2 Contamination Properties

Tetrachloroethylene, also known as perchloroethylene, PCE or PERC is the contaminant of concern at the Site. PCE is in a class of chemical compounds indentified as chlorohydrocarbons, which are characterized by the replacement of hydrogens of a hydrocarbon with a chlorine atom. PCE is primarily a dry cleaning solvent that has historically been used as a degreasing agent.
PCE's physical properties are:
Vapor Pressure: 18.47 mmHg at 77.0°F
Vapor Density: 5.83 (relative to air @ 1.00)
Specific Gravity: 1.63g/ml at 68.0°F
Solubility (water): 200mg/L (0.02%) at 77.0°F
Flammability: Not Flammable but will burn in direct flame
MCL: 0.005 mg/L
Henry's Constant: 0.0184 atm-m^3/mol

4.0 PRELIMINARY PATHWAY ANALYSIS

4.1 SOURCE CHARACTERIZATION

The documented waste source associated with the Farmers Ditch PCE Site consists of PCE-contaminated groundwater. Samples collected from several onsite groundwater monitoring wells on O'Meara Ford indicate the presence of PCE in groundwater. The current interpretation of the Farmers Ditch PCE Site is that a plume of PCE from an undefined source is migrating from off the Site as indicated by several onsite groundwater monitoring wells. Therefore it is possible that the portion of the plume on the O'Meara Ford site may represent a distal terminus of the PCE plume. In the Wassenaar (2011) report prepared for O'Meara Ford, the area north of the site has not been investigated for PCE in the groundwater. The up-gradient and down-gradient nature and extent of the plume is unknown. It is possible this plume contains higher concentrations in an up-gradient or down-gradient direction.

4.1.2 Summary of Potential Sources

The source of the PCE groundwater contamination originating or migrating onto the Site is not known. The O'Meara Ford site could be considered a potential source because PCE was used at the car dealership and groundwater contamination was detected at the site. However, it is also possible that the source of the contamination is an illegal dumping activity in the open space.

A review of potential sources was investigated by using EPA's enviromapper website (http://www.epa.gov/emefdata/em4ef.home). Based on this review, other potential sources of PCE contaminated groundwater include businesses adjacent to the Site and former businesses located along Bannock Street east of the Site. Businesses adjacent to the Site include a car dealership and O'Meara Ford (Figure 2). Further northeast beyond the car dealership is a bowling alley and several restaurants, not usually considered sources or users of PCE. O'Meara Ford currently has monitoring wells indicating PCE contamination up to 103µg/L and TCE at 2.2 µg/L on the southwest plume. Six monitoring wells on O'Meara Ford, adjacent and upgradient of the Site, all indicate PCE contamination ranging from 2.4 µg/L to 103 µg/L.

4.2 GROUNDWATER PATHWAY ANALYSIS

Because of the presence of PCE in the groundwater, Site sources are uncontained with respect to the groundwater migration pathway. There is documented evidence of PCE contamination in the groundwater at the O'Meara Ford Site and the Farmers Ditch PCE Site. According to well data obtained from the Colorado State Engineer's Office, there are 584 drinking water wells (i.e.,

municipal, domestic, and household use wells) located within a 4-mile radius of the Site. However, most of these wells are no longer in service as most of the area is now provided with domestic water by one of several municipal water suppliers. It is unlikely that anyone is using water from the PCE plume for their domestic well water and therefore the risk posed by the groundwater pathway is considered minimal.

Distance from Site	Number of Wells
0-0.25 mi.	1
0.25-0.5 mi.	3
0.5-1.0 mi.	30
1.0-2.0 mi.	72
2.0-3.0 mi.	157
3.0-4.0 mi.	321

Farmers Ditch PCE
Domestic Use Wells

The residential neighborhood adjacent to the Site is within the area served by the City of Northglenn Utilities Division of the Public Works Department. The city's water comes from Standley Lake Reservoir, which in turn receives its water from Clear Creek.

4.3 SURFACE WATER PATHWAY ANALYSIS

The primary surface water feature for the Site is Farmers Ditch. Farmers Ditch is a potential target for a release from the Site by way of overland flow or the groundwater to surface water pathway. The Farmers Ditch system receives its water from Clear Creek near Golden, CO. Surface water samples have not been taken at the Site. The Farmers Ditch water eventually enters the South Platt River approximately 2 miles downstream of the Site. No municipal water intakes are noted for the 15 mile stream target distance limit map (Figure 4).

Threatened and endangered species in Adams County, Colorado are listed in Table 2. According to the U.S. Fish and Wildlife Service National Wetlands Inventory, there is a 0.89 acre fresh water pond adjacent to the Site to the south. There is another 1.2 acre freshwater pond approximately 1000 feet southwest of the Site. No wetlands or fisheries are noted within a mile of the Site.

4.4 AIR AND SOIL EXPOSURE PATHWAY ANALYSIS

The risk posed to human health via the soil exposure and traditional air pathways is not known because the source has not been identified and therefore the nature of any potential surface

contamination is unknown. It is possible that if the source is located on the site and is not covered, the residential neighborhood southwest of the Site may be exposed to PCE vapors. No observable surface spills were noted on the site visit. However, if the source is located on the Site, there is a potential risk from the soil pathway since the Site is unpaved. The residential neighborhood southwest of the Site may be exposed to PCE vapors. If the source is located at O'Meara Ford where the ground surface is covered in pavement, then the commensurate risk of exposure from the soil pathway would be considered minimal.

4.5 AIR AND VAPOR INTRUSION PATHWAY ANALYSIS

Volatile organic compound (VOC) groundwater plumes can result in indoor air contamination in overlying businesses and residences by way of the vapor intrusion pathway. The primary risk potentially posed by the Site is via the vapor intrusion pathway to the residential area adjacent and down-gradient of the Site. Based on CDPHE's Air Screening Concentration Table (Appendix 2), the Residential Action Level for PCE is 41.7 µg/m^3 for a non-cancer hazard quotient (HQ) of 1 (Note this is based on EPA's February 2012 Toxicological Review of PCE in support of the Integrated Risk Information System (IRIS, 2012) http://www.epa.gov/iris/toxreviews/0106tr.pdf).

Based on EPA's Vapor Intrusion Screening Levels Calculator (USEPA, 2013), a PCE groundwater concentration of 58 µg/L could result in an indoor air PCE of 41.7 µg/m^3. This is based on a conservatively derived generic attenuation factor of 1,000. More Site specific data could result in a higher attenuation factor and commensurate higher groundwater concentration to cause potential PCE indoor air concentrations at or above 41.7 µg/m^3. Three monitoring boreholes adjacent to the residences indicate PCE concentrations of 200, 173 and 122 PCE µg/L. Groundwater concentrations in the down-gradient portion of the Site where PCE plume may exceed 58 µg/L poses a possible risk to residents.

5.0 SUMMARY

This PA was prompted by a referral from CDPHE's Voluntary Cleanup Program that identified a plume of PCE present on the Site from an unknown and possible source southwest of O'Meara Ford. The groundwater flowing onto Farmers Ditch PCE Site contains PCE as detected in several on-site groundwater monitoring wells at concentrations ranging between 6.6 µg/l and 200 µg/l. The source of the PCE plume is not known and there are no data on the nature and extent of the plume in the residential area to the southwest.

It is possible the plume originates in the Farmers Ditch PCE Site open space area between O'Meara Ford and the residences. It is unlikely that anyone is using the PCE contaminated groundwater for domestic purposes as the area is on municipal water provided by the City of Northglenn Water and Sanitation Department. No samples have been collected from Farmers Ditch, the primary surface water feature in the area.

The primary risk posed by the Site is via the vapor intrusion pathway in the residential area adjacent to the Site. Based on CDPHE's Air Screening Concentration Table, the Residential Action Level for PCE is 41.7 µg/m^3 for a non-cancer hazard quotient (HQ) of 1. Based on EPA's Vapor Intrusion Screening Levels Calculator, a PCE groundwater concentration of 58 µg/L could result in an indoor air PCE of 41.7 µg/m^3. It is uncertain whether PCE groundwater concentrations in the upgradient portion of the Site have PCE concentrations exceeding 58µg/L, however wells located adjacent to the residential homes indicated PCE levels up to 200 µg/L and therefore could possibly pose a risk to nearby residents. Further investigation is warranted to determine whether this is the case.

6.0 REFERENCES

CDPHE, Voluntary Cleanup Program Files, RV111208-1

CDPHE, 2012, Air Screening Concentration Tables.

Office of the State Engineer, 2013, Denver Colorado, Well Permit Data Base.

USEPA, 1992, Guidance for Performing Site Inspections under CERCLA, Interim Final, EPA/540-R-92-021.

USEPA, Toxicological Review of PCE in support of the Integrated Risk Information System (IRIS,2012) (http://www.epa.gov/iris/toxreviews/0106tr.pdf).

USEPA, 2013, Vapor Intrusion Screening Levels Calculator, http://www.epa.gov/oswer/vaporintrusion/guidance.html

US Fish and Wildlife Service, Threatened and Endangered Species website: http://www.fws.gov/endangered/

US Fish and Wildlife Service, National Wetlands Inventory website: http://www.fws.gov/wetlands/Data/Mapper.html

Wassenaar, A.G., Voluntary Cleanup Program Application, O'Meara Ford Center, 400 West 104th Avenue, Northglenn, CO, December 2, 2011.

Table 1
Farmers Ditch PCE Site
PCE Groundwater Sample Results

Monitoring Well/Soil Boring Number	PCE µg/L	Date Sampled
AGW-1	nd	07/30/13
AGW-2	nd	07/30/13
AGW-3	*5.90*	07/30/13
AGW-4	nd	07/30/13
AGW-5	nd	07/30/13
AGW-6	*5.70*	07/30/13
AGW-7	1.60	07/30/13
AGW-8	0.98	07/30/13
AGW-9	1.10	07/30/13
AGW-10	nd	07/30/13
AGW-11	2.40	07/30/13
AGW-12	*29.60*	07/30/13
AGW-13	**103.00**	07/30/13
AGW-14	**93.30**	07/30/13
AGW-15	**97.30**	07/30/13
AGW-16	2.40	07/30/13
SB-1	nd	01/24/14
SB-2	*6.60*	01/24/14
SB-3	**122.00**	01/24/14
SB-4	**173.00**	01/24/14
SB-5	**200.00**	01/24/14
SB-6	4.60	01/24/14
SB-7	1.10	01/24/14
SB-8	*10.40*	01/24/14

BOLD = Above EPA's Vapor Intrusion Screening Level and CDPHE's Air Screening Concentration Residential Action Level for PCE of 58 µg/L.

Italic = Above Clean Water Act MCL of 5 µg/L.

TABLE2

United States Department of the Interior

FISH AND WILDLIFE SERVICE ECOLOGICAL SERVICES COLORADO FIELD OFFICES

THREATENED, ENDANGERED, CANDIDATE, AND PROPOSED SPECIES ADAMS COUNTY, CO July 2010

Symbols:
* Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states.
? Water depletions in the North Platte, South Platte and Laramie River Basins may affect the species and/or critical habitat associated with the Platte River in Nebraska.
© There is designated critical habitat for the species within the county.
Recent genetic tests identified cutthroat population as GB linage, therefore, consultation is an interim measure until genetic and taxonomic issues are resolved.
§ This applies only to white-tailed or Gunnison's prairie dog habitats. All black-tailed prairie dog habitats within Colorado have been block-cleared from the requirements of ferret surveys.
T Threatened
E Endangered
P Proposed
X Experimental
C Candidate

For additional information contact: U.S. Fish and Wildlife Service, Colorado Field Office, PO Box 25486 DFC (MS 65412), Denver, Colorado 80225-0486, telephone 303-236-4773

Species	Scientific Name	Status
ADAMS		
Least tern (interior population)?	Sternula antillarum	E
Mexican spotted owl	Strix occidentalis lucida	T
Mountain Plover	Charadrius montanus	P
Pallid sturgeon?	Scaphirhynchus albus	E
Piping plover?	Charadrius melodus	T
Preble's meadow jumping mouse	Zapus hudsonius preblei	T
Ute ladies'-tresses orchid	Spiranthes diluvialis	T
Western prairie fringed orchid?	Platanthera praeclara	T
Whooping crane?	Grus americana	E